

REMARKS

Applicants have added claims 37, 38 and 39 to the application to the specific aspect of the invention as set forth at the bottom of page 5 of Applicants' specification. Clearly, this amendment is fully supported by Applicants' specification. Applicants most respectfully submit that all the claims now present in the application are in full compliance with 35 U.S.C. 112.

The rejection of claims 20-36 under 35 U.S.C. 103(a) as being unpatentable over Sugiyama et al in view of Matsuoka et al. and Endo et al. has been carefully considered but is most respectfully traversed.

Applicants wish to direct the Examiner's attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP § 2143. This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

In the Official Action it is urged with respect to claim 20 that Sugiyama et al. (see Fig. 17 and column 6, line 66 et seq.) shows that a SiGe detector can be integrated with a bipolar transistor to provide a detector with sensitivity for light at 1.3 microns using

inexpensive Si technology. In the Official Action, specific reference is made to column 1, line 25 in this regard.

However, Applicants have carefully considered the discussion as set forth at the bottom of column 6 through column 7 of the patent. As noted at column 7, line 19, as shown in Figures 3-5, a semiconductor or device 40 is fabricated by forming a photodiode 25, an optical wave guide 32 and an optical fiber fixing trench 15 on the surface of a P-type silicon substrate 1. It also describes that on the other hand, a trench 5a, reaching the silicon substrate 1 from the surface of an N-type epitaxial layer 3 is formed. In this trench 5a, an insulative material, such as a silicon oxide or so forth is filled to form an isolation region 5. Accordingly, the photodiode 25 is defined by the isolation region 5. Note further at column 7, line 30 that toward the inside of the N-type epitaxial layer 3 from the surface of the photodiode 25, a rectangular recess 6 is formed selectively. At line 45 it is stated that on the other hand, on the overall surface of the photodiode 25 in the optical wave guide 32, a silicon oxide layer 12 for protecting an element that is formed. Clearly, this description in no way suggests the structure of claim 20 of the present application wherein the separated isolation-layer, which separates the phototransistor and the high-speed bipolar transistor, wherein the phototransistor and the high-speed bipolar transistor structure includes a composite collected layer which consists of a collector layer and a photoabsorbing layer, wherein the photoabsorbing layer is formed on the collector layer. Thus, as can be clearly seen in Fig. 2f and Fig. 3 of the present application, the insulation layer is formed through layers 4, 3, 7, 2 and contacts layer 1. This is more specifically defined in newly added claims 37-39. There is absolutely no suggestion of the claim limitations in the prior art, including the primary reference and such claim limitations cannot be ignored. Moreover, the prior art does not contain the necessary motivation to make the modifications to arrive at the claimed invention. Obvious to try is not the standard of obviousness under 35 USC 103.

The present invention mainly provides a single structure of Silicon Germanium photodetector and high-speed transistor relating to the field of high speed optical fibre communication network system, which the photodetector with high responsivity enables to amplify the photocurrent, and the photodetector with adjustable characteristic is able

to achieve to extend the limited detection wavelength with the modulation of the Germanium content.

Further, the invention also provides both of the photodetector and the phototransistor manufactured under one single process to reduce the complexity of the process.

Sugiyama et al. of U.S. 5,747,860, the technology of the Optical-Electronic Integrated Circuits, comprising the medium of the opto-electronic element, does not resemble the invention, wherein the photodetector is merely the structure of the photodiode of SiGe SLs, without the photocurrent amplification and the synchronization processing with the electronic element.

Matsuoka of U.S. 5,557,117, the technology of the Optical-Electronic Integrated Circuits, including the medium of the opto-electronic element as well, wherein the photodetector is formed of a structure of P-i-N type different from the structure of the Multiple Quantum Wells (MQWs) or the SLs based on the invention, and results in several disadvantages of the complexity of the processes with the doped P, N-type layers structure and of the degradation of the high-speed performance. In particular, Matsuoka's is formed of the change of the material of intrinsic layer in P-I-N to achieve adjusting the detection of the photocurrent with different wavelength as well, which is definitely different from the use of the change of Germanium content in the invention. This reference does not overcome the deficiencies of the primary reference and does not render obvious the claimed invention.

Endo et al, U.S. 5,177,583, the technology of Heterojunction Bipolar Transistor (HBT), basically resembles the HBT in the invention but the purpose of the efficacy of the Light Absorption Layer. The invention provides a collector layer having a light absorption layer of SiGe on the HBT without the degradation of the high frequency characteristic, but Endo is nothing for light absorption layer to amplify the photodetection and does not overcome the deficiencies of the primary and first secondary reference.


It is further urged that Matsuoka et al. show (see cover Fig. in column 4, line 48 et seq.) that a high-speed photo receiver can be formed using an integrated structure (column 3, line 17) but do not show a Si material system. Endo et al. show (see cover

Figure and column 11, line 28 et seq.) The formation of a heterojunction bipolar transistor using SiGe as the base. It is concluded that it would have been obvious to use the Sugiyama et al. detector with the structure shown by Matsuoka et al. to provide a high-speed receiver and to use the HBT structure shown by Endo et al. since it is known to be functional. However, there is absolutely no suggestion to make the necessary combination of references and to arrive at the presently claimed structure absent applicant's specification. Applicant's teaching may not be used to provide the necessary motivation to combine the references and arrive at the presently claimed invention. Applicant's most respectfully submit that a prima facie case of obviousness for the claimed subject matter has not been established in according with the requirements of the aforementioned MPEP section. Accordingly, it is most respectfully requested that this rejection be withdrawn.

In view of the above comments and further amendments to the claims, favorable reconsideration and allowance of all the claims now present in the application are most respectfully requested.

Respectfully submitted,

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